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U.S. Naval Observatory Press Release

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USNO Astronomer Catches Bright Flash of Dying Star

Some 27 million years ago a massive star in an outer spiral arm of a galaxy known as Messier 51 reached the end of its life. Within a matter of minutes the star's core collapsed onto itself, then rebounded in a cataclysmic explosion known as a supernova. The "flash" of visible light from the dying star, billions of times brighter than the star's normal light output, enabled Earth-based astronomers to detect the event on May 31, 2011.

Astronomers around the world, both amateur and professional, immediately began to turn their telescopes toward the cosmic interloper. An astronomer at the U.S. Naval Observatory Flagstaff Station (NOFS) in Arizona obtained this high-resolution image of M51 and the supernova (dubbed SN 2011dh by the International Astronomical Union) on June 7, 2011 using the Observatory's 1.3-meter telescope and a Charge-Coupled Device (CCD) camera. Dr. Marc Murison assembled the image from three separate exposures made through color filters.

Supernovae are extremely rare events that occur infrequently in most galaxies. No supernova has been observed within our Milky Way galaxy since the one discovered by Johannes Kepler in 1604. While supernovae are discovered almost daily in very remote galaxies, the opportunity to study one in a nearby galaxy such as M51 comes along only a few times in a decade.

By analyzing the spectrum of SN 2011dh Murison was able to confirm that this is a "Type-II" supernova, produced when the core of a massive star suddenly implodes. The progenitor star has been tentatively identified in images made from the Hubble Space Telescope. The star is thought to have had a mass between 18 to 24 times that of the Sun.

Messier 51 is a favorite target of astronomers and may be seen with binoculars or small telescopes from dark locations on a Moonless night. It was nicknamed "The Whirlpool Nebula" by William Parsons, Third Earl of Rosse, who first detected the galaxy's spiral structure with his 72-inch aperture reflecting telescope at Birr Castle in Ireland in 1845. Even at an estimated distance of between 23 million to 27 million light-years from Earth, M51 is one of the closer galaxies to the Earth and has therefore been studied extensively with state-of-the-art Earth- and space-based telescopes.

The Naval Observatory Flagstaff Station, established in 1955, is the Navy's premier dark-sky astronomical observing site. Its telescopes are widely used in support of many Department of Defense and civilian scientific research programs.

The 1.3-meter reflector is the newest telescope at the Flagstaff Station, completed in the late summer of 1999. The telescope is a modified Ritchey-Chretien optical design with a corrector lens designed to produce a very large, well-corrected field about 1.3 degrees in diameter. A large-format mosaic CCD camera incorporating a 2x3 mosaic of 2048x4096 e2v CCDs is used to take advantage of this design, which offers wide-field imaging with excellent astrometric properties.

Technical details of the image from Dr. Murison:

SN 2011dh on 2011-06-07 UT. NOFS 1.3-meter telescope, e2v array camera chip 2. The image is a combination of Sloan g- and r-band exposures of 10 minutes each, and a Sloan i-band exposure of 4 minutes. From a separate 240 second Sloan r-band image, in which the supernova is not over-exposed, the UCAC R magnitude is approximately 13.5. The magnitude measurement is a 2D Moffat profile fit to aperture photometry, calibrated to a third-order polynomial fit to the R magnitudes of the UCAC stars in the image. The winds had just died down from a wind storm (40+ mph gusts), so seeing was not great: 2.0-2.5 arcsec fwhm. Histogram stretching and stacking of the separate images produces an aesthetically pleasing result, but it destroys scientific content. In addition, since the bandpasses of the filters used do not correspond to what our eyes see (and our brains interpret) as blue, green, and red, the colors in this image are artificial.

A full-resolution version of this image may be obtained from:

http://www.usno.navy.mil/USNO/tours-events/sky-this-week/images_skyweek/SN2011dh_NOFS.jpg



Image of SN 2011dh in Messier 51, imaged with the U.S. Naval Observatory Flagstaff Station's 1.3-meter telescope, June 7, 2011. Composite of three images made through Sloan g-, r- and i-band filters.

U.S. Naval Observatory image courtesy Dr. Marc Murison